

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A phase mask for forming a diffraction grating in an object for an optical medium by exposing the object to UV light containing diffracted light rays through the phase mask to cause a refractive index of a photosensitive part of the object to change by interference fringes produced by interference of diffracted light rays of different orders of diffraction, the phase mask comprising:

a transparent substrate having a surface provided with a pattern of a plurality of grooves, the pattern being entirely transparent;

wherein:

each of the grooves has a duty ratio dependent on a position of the respective groove on the substrate;

the duty ratio is highest at a center position of the substrate, and decreases proportionally toward both peripheral portions of the substrate;

the duty ratios for the grooves are selected so that the phase mask can be used to perform an apodization exposure of the object when the object is exposed to the UV light through the phase mask; and

the plurality of grooves are arranged on the substrate in a single pitch, the duty ratios being determined by varied widths of the grooves.

2. (Canceled)

3. (Canceled)

4. (Previously Presented) The phase mask according to claim 1, wherein the phase mask is configured so that the phase mask can be used to form a diffraction grating in the object having a discontinuously changing period.

5. (Previously Presented) The phase mask according to claim 1, wherein the phase mask is configured so that the phase mask can be used to form a diffraction grating in an object used to form an optical waveguide.

6. (Previously Presented) The phase mask according to claim 5, wherein the phase mask is configured so that the phase mask can be used to form a diffraction grating in an object used to form an optical fiber.

7. (Currently Amended) A method of fabricating a phase mask including a transparent substrate having a surface provided with a pattern of a plurality of grooves, the pattern being entirely transparent, for forming a diffraction grating in an object for an optical medium by exposing the object to UV light containing diffracted light rays through the phase mask to cause a refractive index of a photosensitive part of the object to change by interference fringes produced by interference of diffracted light rays of different orders of diffraction, the method comprising:

preparing a transparent substrate; and

processing the transparent substrate to form the pattern of grooves by a photolithographic process including an exposure step, a pattern development step and an etching step;

wherein:

the exposure step is performed so that each of the grooves has a duty ratio dependent on a position of the respective groove on the substrate;

the duty ratio is highest at a center position of the substrate, and decreases proportionally toward both peripheral portions of the substrate;

the duty ratios for the grooves are selected so that the phase mask can be used to perform an apodization exposure of the object when the object is exposed to the UV light through the phase mask; and

the plurality of grooves are formed on the substrate in a single pitch, the duty ratios being determined by varying widths of the grooves.

8. (Previously Presented) The method according to claim 7, wherein the exposure step comprises performing a multiple exposure method to form the grooves having duty ratios dependent on the positions of the grooves.

9. (Canceled)

10. (Previously Presented) The method according to claim 7, wherein the exposure step in the photolithographic process is performed using an electron lithography system or a laser lithography system.

11. (Previously Presented) The method according to claim 7, wherein the phase mask is formed in a configuration that permits the phase mask to be used to form a diffraction grating in an object used to form an optical guide.

12. (Previously Presented) The method according to claim 11, wherein the phase mask is formed in a configuration that permits the phase mask to be used to form a diffraction grating in an object used to form an optical fiber.

13. (Canceled)

14. (Canceled)